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ORIGINAL ARTICLE

The value of reasons for encounter in early detection of colorectal cancer

Susan J.M. van Boxtel-Wilms^a, Kees van Boven^a, J.H. Hans Bor^a, J. Carel Bakx^{a†}, Peter Lucassen^a, Sibö Oskam^b and Chris van Weel^{a,c,d}

^aDepartment of Primary and Community Care, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands; ^bFormerly of the Department of General Practice, Academic Medical Centre, University of Amsterdam, Amsterdam, the Netherlands; ^cDepartment of Primary and Community Care, Radboud University Medical Centre, Nijmegen, The Netherlands; ^dAustralian Primary Health Care Research Institute, Australian National University, Canberra, Australia

KEY MESSAGES

- Research into the reasons for encounter is a new method using a patient-centred reason for seeking care to study the predictive value for potentially bad outcomes.
- By using reasons for encounter, diagnostic criteria for GPs can be improved.

ABSTRACT

Background Symptoms with a high predictive power for colorectal cancer (CRC) do not exist.

Objective To explore the predictive value of patients' reason for encounter (RFE) in the two years prior to the diagnosis of CRC.

Methods A retrospective nested case-control study using prospectively collected data from electronic records in general practice over 20 years. Matching was done based on age (within two years), gender and practice. The positive likelihood ratios (LR+) and odds ratios (OR) were calculated for RFE between cases and controls in the two years before the index date.

Results We identified 184 CRC cases and matched 366 controls. Six RFEs had significant LR+ and ORs for CRC, which may have high predictive power. These RFEs are part of four chapters in the International Classification of Primary Care (ICPC) that include tiredness (significant at 3–6 months prior to the diagnosis; LR+ 2.6 and OR 3.07; and from 0 to 3 months prior to the diagnosis; LR+ 2.0 and OR 2.36), anaemia (significant at three months before diagnosis; LR+ 9.8 and OR 16.54), abdominal pain, rectal bleeding and constipation (significant at 3–6 months before diagnosis; LR+ 3.0 and OR 3.33; 3 months prior to the diagnosis LR+ 8.0 and OR 18.10) and weight loss (significant at three months before diagnosis; LR+ 14.9 and OR 14.53).

Conclusion Data capture and organization in ICPC permits study of the predictive value of RFE for CRC in primary care.

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Introduction

Colorectal carcinoma is one of the most prevalent types of cancer in the developed world. In The Netherlands, colorectal cancer (CRC) is the second most prevalent type of cancer in women and the third in men. The annual incidence was 6–8 per 10 000 persons.[1–4]

Most of the patients diagnosed with CRC will initially visit their general practitioner (GP) with symptoms such as rectal bleeding, anaemia and change of bowel habit.[3,4] These symptoms have a wide range in sensitivity and specificity, which depends on age

and gender.[5–7] For example, the sensitivity for rectal bleeding ranged from 0.25 to 0.86, while the specificity ranged from 0.25 to 0.88.[8–10] In combination with the low incidence of CRC in primary care this results in problems in predicting CRC in primary care.[3,10] For example, for rectal bleeding the positive predictive value in primary care patients ranges from 2.16 in women aged 50–59 years to 7.69 for men aged 70–79 years.[6] Although combinations of symptoms improve the sensitivity, they diminish specificity.[8]

Generally, patient symptoms have been found to have low positive predictive value, giving little guidance to GPs for distinguishing between self-limiting

CONTACT Susan van Boxtel-Wilms ✉ susanwilms@outlook.com ☎ Department of Primary and Community Care, Radboud University Nijmegen Medical Centre, Huispost 117 ELG, attn. Kees van Boven, Geert Grooteplein Noord 21, 6500 HB, Nijmegen, The Netherlands

[†]Deceased

and severe conditions. It is desirable to improve the diagnostic process. A promising example is the reason for encounter (RFE), a literal description of why the patient has consulted the GP.[11,12] The International Classification of Primary Care (ICPC) captures RFE and allowed us to answer the following question: do primary care patients with colorectal cancer (CRC) differ from others in their reason for encounter in the two years prior to the diagnosis of CRC?[13]

Methods

Design

We performed a retrospective nested case-control study using prospectively collected data from electronic records in general practice over 20 years from which new CRC patients were identified and compared with two matched controls sampled from the same population. We used all data from the different encounter types (face-to-face encounters, telephone encounters and repeat prescriptions) with the exception of letters, that were routinely gathered during contacts with patients of nine GPs participating in a practice-based research network (Transition Project).[14] We excluded administrative records.

Data source

Data prospectively and routinely registered in the Transition Project were collected and analysed. The Transition Project is a practice-based research network of currently nine Dutch GPs in five practices with 15 000 patients started in 1985.[15] In the Transition Project GPs routinely code each episode of care according to the ICPC in an episode structure.[13,16,17] With this classification the GP codes each patient's RFE, the diagnosis and the interventions (referral, prescription, examinations). The Transition Project is the only practice based research network in which the RFE is coded (Box 1).[12,13,18] The ICPC classification has proven to be a very proper tool with high validity for eventual diagnoses, and RFE which reflects the patients' perspective.[19] The Transition Project is highly reliable due to the well-defined diagnostic criteria and because the electronic system gives a warning in a case of error or inconsistency.[12,20,21]

Population

We included all patients diagnosed with a new episode of CRC between 1 January 1992 and 31 December 2011. All patients had to have at least two years of

record information before the diagnosis. Patients were compared with controls without CRC matched for age (within 2 years), gender and practice; the controls also had to have at least two years of records before the index date and an encounter with their GP within one month of the index date. The index date was the date on which the GP registered the diagnosis CRC either after receiving a letter from a specialist or after being told by the patient. We selected two controls per CRC case.

Procedure

The data were analysed as a retrospective nested case-control study. The index dates (of diagnosis) were extracted from the Transition Project. We compared cases and controls in four periods: a period of 3 months before diagnosis, [1] 3–6 months prior to diagnosis, [2] 6–12 months prior to diagnosis [3] and 1–2 years prior to diagnosis [4]. We analysed the data with SPSS 18. Mean numbers of encounter and episode were calculated. In order to compare the case and control group the episode CRC was excluded for these mean numbers.

All ICPC codes were analysed separately as well as the broader ICPC chapters or categories of diagnostic codes.

All RFEs and the clustering of RFEs within ICPC chapters were considered in the analyses.

We calculated the positive likelihood ratios (LR+) and odds ratios (OR). Confidence interval (95% CI) was calculated.

Results

We identified 186 patients from the five practices within the Transition Project. Two cases had only one control and, for two cases, we could not find a control; the ones without a control were excluded. Thus, 184 patients were compared with 366 controls. Of the patients, 57.1% (105) were male. The mean age at diagnosis was 70.05 years. For controls, the mean age was 69.87 years (Table 1).

Table 1. Characteristics of patients.

	Case	Control	P
Number (percentage)	184	366	0.86
• Male	105 (57.1%)	206 (56.7%)	
Mean age at index date in years (standard deviation in years)	70.05 (13.24)	69.87 (13.25)	0.88
Mean number per patient (standard deviation) of			
• encounter	21.77 (16.84)	20.46 (18.11)	0.41
• episode	11.17 (7.61)	10.22 (7.75)	0.17

Table 2. RFE as start of an episode for cases and controls per chapter per time-period expressed as OR.

Chapter of RFE	Period	Cases	Controls	OR	CI (95%)	P
A	0–3mth	42	41	2.36	1.46–3.82	0.00*
	3mth–6mth	21	16	3.07	1.49–6.31	0.00*
	6mth–1y	31	53	1.24	0.74–1.54	0.42
	1y–2y	43	85	1.01	0.66–1.54	0.97
B	0–3mth	9	2	16.54	2.08–131.42	0.00*
	3mth–6mth	2	1	4.00	0.36–44.11	0.26
	6mth–1y	6	6	2.00	0.65–6.20	0.23
	1y–2y	4	5	1.60	0.37–5.96	0.48
D	0–3mth	101	25	18.10	9.43–34.75	0.00*
	3mth–6mth	33	22	3.33	1.87–5.96	0.00*
	6mth–1y	33	43	1.59	0.99–2.56	0.06
	1y–2y	45	73	1.32	0.85–2.06	0.21
T	0–3mth	15	2	14.53	3.32–63.62	0.00*
	3mth–6mth	4	4	2.26	0.48–10.42	0.30
	6mth–1y	8	11	1.46	0.59–3.62	0.42
	1y–2y	11	23	0.95	0.44–2.04	0.90

A = general/unspecified

B = blood/immunology

D = digestive

T = endocrine/metabolic

* = $P < 0.05$.

0–3mth = from 1 day after index date until 3 months prior to the diagnosis.

Table 3. Specific RFE as start of an episode for cases and controls per time-period expressed as OR.

RFE	Period	Cases (n = 184)	Controls (n = 366)	OR	CI (95%)	P
Tiredness	0–3mth	19	9	4.22	1.91–9.33	0.00*
Anaemia	0–3mth	5	0			
Local abdominal pain	0–3mth	23	4	11.50	3.98–33.25	0.00*
	3–6mth	8	4	4	1.21–13.28	0.02*
Constipation	0–3mth	13	3	8.67	2.47–30.41	0.00*
Rectal bleeding	0–3mth	33	0			
	3–6mth	8	2	8	1.70–37.67	0.00*
	1y–2y	8	3	7.30	1.53–34.71	0.01*
Weight loss	0–3mth	8	1	15.06	1.88–120.81	0.01*

The mean number of encounters (repeat prescriptions included and the CRC episode excluded) for all RFE chapters was 21.77 for cases and 20.46 for controls. The mean number of new started episodes was 11.17 for cases and 10.22 for controls (Table 1).

Most cases (97%) were referred within 90 days from the start of complaints related to the cancer by their GP, four cases were referred between 91 and 180 days and two cases were referred more than a year after the start of the complaints. One CRC patient refused a referral.

Although we studied all ICPC codes and the 17 ICPC chapters, due to the small numbers of patients and large confidence intervals, we only present findings for six reasons for encounter and the four chapters that showed differences between cases and controls: chapter A 'general/unspecified' (most important RFE tiredness), chapter B 'blood/immunology' (most important RFE 'I think I have an anaemia'), chapter D 'digestive' (most important RFEs abdominal pain, rectal bleeding and constipation), and also chapter T 'endocrine/metabolic' (most important RFE weight loss).

Table 4. RFE as start of an episode for cases and controls per chapter per time-period expressed as LR+.

Chapter RFE	Period	Cases (n = 184)	Controls (n = 366)	LR+	CI (95%)
A	0–3mth	42	41	2.0	1.4–3.0
	3mth–6mth	21	16	2.6	1.4–4.9
B	0–3mth	9	2	9.8	2.0–41.0
D	0–3mth	101	25	8.0	5.4–12.0
	3mth–6mth	33	22	3.0	1.8–5.0
	6mth–1y	33	43	1.5	1.0–2.3
T	1y–2y	15	2	14.9	3.4–64.5

Table 5. Specific RFE as start of an episode for cases and controls per time-period expressed as LR+.

RFE	Period	Cases	Controls	LR+	CI (95%)
Tiredness	0–3mth	19	9	4.1	1.9–9.1
Anaemia	0–3mth	5	0	–	–
Local abdominal pain	0–3mth	23	4	11.4	4.0–32.6
	3mth–6mth	8	4	4.0	1.2–13.0
Constipation	0–3mth	13	3	8.6	2.5–29.9
Rectal bleeding	0–3mth	33	0	–	–
	3mth–6mth	8	2	8.0	1.7–37.1
	1y–2y	8	3	5.3	1.4–19.6
Weight loss	0–3mth	8	1	15.9	2.0–126.3

Differences between cases and controls

Reasons for encounter. In the period 1–2 years before the index date there were no differences in RFE except for rectal bleeding (LR+ 5.3 and OR 7.30, both with wide confidence intervals; see Tables 3 and 5 for the specified RFEs). Three to six months prior to the index date RFE in the chapter containing abdominal pain, rectal bleeding and constipation was significantly higher in CRC patients (LR+ 3.0 and OR 3.33; see Tables 2 and 4). In the period 3–6 months prior to the index date, significant differences in the chapter containing tiredness became visible (LR+ 2.6 and OR 3.07). In the 3 months before the index date differences in RFE were found in 4 of the ICPC chapters, namely the chapters containing tiredness (LR+ 2.0 and OR 2.36), anaemia (LR+ 9.8 and OR 16.54), abdominal pain, rectal bleeding and constipation (LR+ 8.0 and OR 18.10) and weight loss (LR+ 14.9 and OR 14.53).

Discussion

Main findings

RFEs belonging to chapter A 'general/unspecified' (most important RFE tiredness), chapter B 'blood/immunology' (most important RFE 'I think I have an anaemia'), chapter D 'digestive' (most important RFEs abdominal pain, rectal bleeding and constipation) and chapter T 'endocrine/metabolic' (most important RFE weight loss) showed differences (higher LR+s and ORs) between cases and controls mainly in the period 3 months prior to the diagnosis and also for RFEs

belonging to chapter A and D 6 months prior to the diagnosis. Most LR+ is below 10 and not important. The higher LR+ for weight loss and local abdominal pain could be expected because we started our study from the diagnosis CRC. The differences between RFEs in the cases and the controls disappeared after 6 months prior to the diagnosis of CRC. Other RFEs did not show differences between cases and controls, for example 'change of faeces/bowel movements,' 'diarrhoea,' 'abdominal mass NOS' and 'abdominal distension'.

Comparison with existing literature

The LR+ and the ORs of some specified RFEs in our study compared with the LR+ of the symptoms reported by Hamilton show the same trend.[7] They become more discriminatory near the time of diagnosis. Because CRC does not have symptoms with a high predictive power, RFE could be of potential importance. To demonstrate or to exclude this, more data with higher sample sizes are needed. Since this is the first study regarding RFE and CRC, we investigated RFE on the level of ICPC chapter to provide a general picture. Due to the relatively small numbers, we could only make reliable statements with wide confidence intervals concerning specified ICPC codes six months prior to the diagnosis. Since certain ICPC chapters proved significant association with CRC, further research should be focused on more specified RFE or combinations of RFE with patient characteristics to begin to understand patterns in primary care. A systematic review found that patients in primary care had a higher risk of CRC if rectal bleeding was accompanied by weight loss or change in bowel habit.[22] By adding RFE to these combinations, it is likely that pooled positive predictive values can be improved. Displaying symptoms as RFEs emphasizes the importance of patients' spontaneous expressed reasons to contact the GP for diagnosing cancer. Recording the RFE indicates the direction for history taking, physical examination and further diagnostics. The ICPC system is essential for this search for potentially meaningful patterns because the system gives an insight in the encounters of patients. It is possible patterns can be identified in other diseases.

Strengths and limitations

This is the first study comparing RFE of cases and controls in the period before the diagnosis CRC in a relatively large sample.

An advantage of the Transition Project is that the system provides reliable RFE data as a result of the well-defined diagnostic criteria and automatic warning systems to prevent double coding and the high concordance in RFE between patient and GP.[12,19–21]. Therefore, we were able to study the patients' perspective. This provides unique information for new methods of recognizing CRC in real life general practice consultations. The latter is especially valuable because we think strengthening the diagnostic process of CRC should be investigated in real life conditions.

We found that two specific RFE had a high LR+ in the 3 months before diagnosis (local abdominal pain and weight loss). The other LR+ show a moderate to small LR+ and are therefore clinically not relevant.

The odds ratios of the specific RFEs have a high number (between 4 and 15.06) and are therefore promising. However, due to the relatively small population the CIs are wide. Therefore, the clinical relevance of the described numbers is not yet clear.

A limitation of our study is that the index date may be less reliable due to delays in informing the GP. It is possible that as a result the cases have a higher number of encounters due to the recently diagnosed CRC and consequently a higher number of RFE.

The Transition Project does not register the socioeconomic state of patients; therefore, we matched cases with controls of the same practice since most Dutch GP practices are organized geographically.

Future perspectives

Studying the relationship between RFEs and diagnoses within episodes has tremendous potential for providing better diagnostic criteria to GPs, which is an important task of primary care. GPs also have insight in individual patients' risk profiles, such as life style and family history of colon cancer, and the diagnostic process would in particular benefit from relating reasons for encounter to individual 'risk profile'.

Conclusion

The study has explored the differences in reasons for encounter between matched patients in shared geography with and without CRC. Significant differences are found between the two groups regarding specific symptoms apart and related to ICPC chapters. Studies like this may strengthen diagnostic tools in primary care and may be further strengthened by exploring reasons for encounter with patients' individual risk profiles, for example regarding hereditary conditions.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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